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InterBoxes: A social innovation in education in rural China

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ABSTRACT

Social innovation has increasingly become a hot topic in China, a process in which multiple sectors collaborate with each other, aiming to change the status quo through creative, effective, efficient and sustainable ways. InterBoxes is an innovative project in the form of a social enterprise that commits to improving physical school conditions by building libraries, classrooms, schools and dormitories with refurbished cargo shipping containers called "Boxes". Within the scope of this project the word "Inter" signifies that each Box is equipped with an Internet connection to the outside world. Conceptually, as a social enterprise, the for-profit, business arm of InterBoxes is projected to operate within metropolitan areas, building structures such as cafés, gyms, bookstores, etc., all which will generate revenue to support the nonprofit operation in rural areas. This descriptive case study examines the implementation and use of InterBoxes as a library in a rural primary school and addresses the promises and challenges facing the project. The findings indicate that InterBoxes demonstrates much potential as a social innovation to improve physical school conditions and other rural education issues through the creative use of space and place. Recommendations for scaling up its operation in connection with a larger global network of innovation using shipping containers are discussed.

1. Introduction

As social problems become increasingly complex and interrelated, a need for dynamic solutions has emerged. In response, policy makers, researchers, and practitioners have begun to build cross-sector approaches, coalescing in the growth of socially innovative practices. Broadly, social innovation is a process which harnesses creative, collaborative, and effective methods to solve complicated social problems including those related to aging populations, crime, environmental change, and growing urban centers (Huang & Donner, 2018; Mulgan, 2006; Preskill & Beer, 2012). As presented by the Stanford Business Center for Social Innovation (2018), social innovation should be understood as a process which utilizes effective solutions to challenging, complex, and systemic social issues. Moreover, social innovation is driven to develop solutions for social reasons rather than financial profit (Mulgan, 2006). Essentially, social innovators identify a problem - an unmet social need, and determine a novel approach to filling the gaps in service provision. Across the literature social innovation is defined not by a single practice but in diverse forms including interventions, system processes, communication, relationship building and programs (Huang & Donner, 2018; Mulgan, 2006; Preskill & Beer, 2012). In particular, Preskill and Beer (2012) state that the primary focus of all these approaches, and in turn the defining aspect of this nascent field of practice, is the exploration of emerging methods which have yet to be evaluated or implemented.

Mulgan (2006) suggests that social innovation is often motivated during times of extreme economic reform and industrial production. From this perspective, China is particularly well primed to develop a social innovation sector in the coming years. Though the nonprofit arena (alternatively considered as organizations committed to increasing social welfare), has historically been tied almost entirely to the state, shifts in political control over recent decades has provided opportunity for a variety of social welfare organizations to persist. Moreover, as China engages in an increasingly open and global economic system, the social needs of the population increases, resulting in the growth of the nonprofit sector (Yang et al., 2015).

The Chinese government is prioritizing innovation and developing the capacity necessary in support of a national goal: "Promote social management system innovation" (Lai & Zhou, 2017, p. 8). In moving towards a national agenda, China supports diversifying forms of social service delivery as well as seeding venture capital funds committed entirely to modernizing the nonprofit sector (Lai & Zhou, 2017; Zhao, 2012). Under this approach, the federal government supports the development of socially innovative practices which target social welfare

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issues such as education and environmental conservation (Zhao, 2012). Additionally, private companies or corporations have been placing growing importance on integrating social responsibility into their associated business models and philanthropic endeavors (Lai & Zhou, 2017). This aspect of social innovation has been defined as "corporate social responsibility". As presented by Lai and Zhou (2017): "By establishing or investing in private foundations and impact investment funds, these business leaders actively seek solutions to some of the pressing social issues in China, such as food safety, clean water and air, elder care, and education" (p. 8).

Challenging the efficacy of progressive policy, nonprofits in China have historically faced barriers when attempting to establish legitimacy, specifically as federal policies relate to the registration system. To obtain official status as a nonprofit (and receive the associated reduced tax burden), organizations are required to register and receive approval through two governmental entities (a process referred to as "dual administration"): the Ministry of Civil Affairs and a local supervisory office (Yang et al., 2015; Zhao, 2012). Several authors present evidence that organizations attempting to complete this process are often unable to obtain approval through the local supervisory agency (Yang et al., 2015; Zhao, 2012). To quantify the issue, Lai and Zhou (2017) cite that there were approximately 670,000 registered nonprofit organizations, with another 4.6 million existing without formal approval through the dual administration system in 2016. In turn, what would typically be identified as nonprofit groups, instead register as for-profit entities, masking the true range of traditionally defined social service provision. It should be noted that a recent policy change has eliminated the need for nonprofits to continue to register at both locations which has resulted in larger numbers of registered organizations. As such, a growing number of nonprofits will have increasingly direct access to federal and private funding necessary to grow programs committed to distributive social justice (Yang et al., 2015).

2. Social innovation

Interestingly, the concept of socially innovative enterprises in China are often conceptualized under the purview of startup ventures, a definition predicated on the high level of risk involved with the development of novel approaches targeting solutions to social issues. Additionally, there has been considerable growth in financial support of this field, as can be observed by the development of large foundations such as the China Social Entrepreneur Foundation and the Non-profit Incubator's Venture Philanthropy Fund (Lai & Zhou, 2017; Zhao, 2012). As mentioned above, philanthropic ventures seeded by corporations are often working in tandem with federal and private donations. Thus, emerging socially innovative organizations can be described as seeking startup capital to fund the activities necessary to develop a sustainable and effective system of service delivery.

Furthering the shift towards social innovation, changes in the economy and social structure of China have pushed the country to engage in increasingly creative and market-based activities while facing a reduction of government participation and engagement in combating social issues (Lai & Zhou, 2017; Zhao, 2012). This economic and political change has brought untended consequences including income disparity and environmental pollution which - when paired with a reduction of the governmental welfare safety net - has generated a need for innovative solutions to social issues. In response, social innovation has emerged as a possible option to fill gaps in service provision (Lai & Zhou, 2017; Zhao, 2012). As presented by Mulgan (2006) industrialization and urbanization often present as drivers for phases of intense social innovation. It goes without question, that as China increasingly participates in the global market, continued growth in urban centers and industry will emerge.

Though social innovation is set to take-off in China, the field has been influenced by information exchanges with similar initiatives occurring in the United States and the United Kingdom. However, the history of social innovation in these countries is much different. For example, Mulgan (2006) notes that citizens in the late nineteenth century Britain developed creative, non-traditional approaches to meet the needs of childcare and housing. More recently, in the United States, the Harvard business school established a social enterprise initiative in 1993 leading to a diverse array of strategic programmatic approaches to utilizing a market-based economy for social good (Harvard Business School Social Enterprise website, 2018; Zhao, 2012). Moreover, in 2007 the United Kingdom arranged for a team of Chinese business leaders and officials to visit operating social enterprises, which eventually led to intense ideological collaboration between the two countries (Zhao, 2012). More recently, in 2010 the United Kingdom and China collaboratively developed the Greater China Social Entrepreneur Forum, which worked to coalesce a formalized social innovation community in China (Zhao, 2012). It is important to note, that these countries have experienced a very different development of the charity sector when compared to China, which carriers a greater federal responsible regarding the social needs of the population. European nations have also paved the way regarding formalized regulations targeting social innovation implementation. For example, Huang and Donner (2018) note that the first five countries to pass legislation regarding to organizations that operate independently from the federal government with the mission of increasing social problems were scattered across the European continent.

Given the complexity of social problems, fully engaging in social innovation requires a multidimensional approach to developing solutions. The actual application of social innovation into practice is observed across continuum of programs, and ranges from those that rely entirely on donor contributions to self-sustaining for-profit models. From this perspective, social enterprises are just one form or approach undertaken in the field of social innovation. To define concretely, social enterprises are organizations which integrate the private and nonprofit sectors with the goal of increasing general population welfare. More specifically, such organizations seek to capture resource surpluses drawn from private market gains and redistribute them to projects filling gaps in social service delivery (Huang & Donner, 2018; Mulgan, 2006; Roy, Donaldson, Baker, & Kerr, 2014; Zhao, 2012).

A defining characteristic of the social enterprise approach to social innovation is the goal of developing a sustainable funding stream in lieu of in-kind donation dependency (Huang & Donner, 2018; Lai & Zhou, 2017). This is not to say that social enterprises are fully self-sufficient, but rather, continuously strive to strengthen the income-generating arm of the organization. Often, long-term approaches will rely on smaller proportions of philanthropy over time, leading to an increasingly sustainable model of business. More formally, the European Commission's Social Business Initiative defines social enterprises as being composed of: engagement in economic activities; goals that aim to better society; prioritize the goals over profit making; a separation from governmental/for-profit organizational control; and lastly, display of democratic systems for operations (Huang & Donner, 2018).

The value of social enterprises has been evaluated across a diverse array of fields. Several authors suggest that the utilization of a social enterprise model can lead to improved outcomes across a variety of measures including unemployment, community, homelessness, and social connectedness (Huang & Donner, 2018; Ferguson & Bin, 2008; Macaulay, Mazzei, Roy, Teasdale, & Donaldson, 2018; Zhao, 2012). For example, Ferguson and Bin (2006) reported homeless youth who participated in a social enterprise intervention reported higher life satisfaction and increased contact with family and peers six months after program completion. Additionally, in a qualitative study conducted by Macaulay et al. (2018) participants in social enterprise programs reported more stable employment and strengthened feelings of ownership and control over community resources. In light of this promising evidence, we will present a case study of study of InterBoxes, an innovative startup with the mission of strengthening community-conditions, specifically those related to schooling children in rural China.

3. Left-behind children

Left-behind children have become a distinct group in rural China as a result of a variety of institutional and structural factors (Feng & Li, 2018; Guan & Deng, 2018; Hu, Lu, & Huang, 2014; Jiang, Hu, Zhu, & Jiang, 2018; Li, Zhang, & Li, 2018; Macaulay et al., 2018; Xie, Huang, Chen, & Hao, 2018; Zhao et al., 2017) Population growth, urbanization, industrialization, and the household registration policy - Hukou - which favors urban residents to rural, have created an environment in which employment and opportunity are increasingly concentrated within urban centers. Massive migration into cities has resulted, often leaving the children of working parents behind in rural communities (Guan & Deng, 2018; Hu et al., 2018; Hu et al., 2014; Jiang et al., 2018; Li, Zhang, & Li, 2018; Macaulay et al., 2018; Xie et al., 2018). Though estimates of the rural left-behind children population size vary tremendously, a recent report from the Chinese Ministry of Civil Affairs suggests a number around six million (Ministry of Civil Affairs of the PRC, 2016).

Left-behind children face a greater number of developmental challenges when compared to their urban counterparts, which include weak socio-emotional support, lack of strong positive parental connections, and a reduction in quality educational opportunities (Guan & Deng, 2018; Hu, 2018; Hu et al., 2014; Li et al., 2018). This particular population often struggles with depression and negative health outcomes (Guo et al., 2015; Li, Liu, & Zang, 2015). Extant research has also illuminated how the degradation of community networks has led to a dearth of important social capital for left-behind children, particularly in the form of familial bonding and support (Guan & Deng, 2018; Hu et al., 2018; Hu et al., 2014; Li et al., 2018; Macaulay et al., 2018; Xie et al., 2018).

4. School mergers

One of the most hotly debated structural drivers of rural and urban disparities in China, specifically within the realm of education, is the “Decision on Basic Education Reform and Development” a policy passed into action in 2001 and ended in 2012. The primary goal of this strategy was to increase the quality and equity of national education by aggregating resources; combining small rural schools into fewer yet larger (and in theory better funded) institutions. Additionally, a national movement towards a nine year compulsory education system had begun in the early 1990's and continued into the 2000's (Chen, Eggleston, Zhang, Zhao, & Zhou, 2017). These policies combined, created the need for rural youth to attend school even if it required traveling to a different town. Reviews considering the impact of the school merger policy on rural youth education outcomes have most decisively been mixed.

Liu, Zhang, Lou, Rozelle, and Loyalk (2010) suggest that there has been relatively little impact on youth education outcomes as a result of the merger program. Conversely, Chen et al. (2014) posit that impoverished youth who are forced to travel farther distances to newly agglomerated schools, and who also experience feelings of discomfort due to a lack of familiarity, will overtime display a reduction in educational attainment. Recently, Cai, Chen, and Zhu (2016) argue that though some youth display improved academic achievement as a result of the merger policy, there is also an increased financial burden placed on rural families, which may lead to reduced education engagement over time. Regardless of the position, there is common agreement across the literature that the centralization of schools requires that youth must now travel farther to obtain pre-secondary education, the impacts of which lead to increased time and financial burdens for rural residents.

5. Rural education initiatives

In response to the challenges that have appeared as a result of school mergers, a number of initiatives have been developed with the goal of strengthening the educational infrastructure of rural China. For example, since the 2008 earthquake in Sichuan province, there has been a movement towards increasing the quality of school infrastructure, particularly in rural areas of the country. By 2012, the Chinese government had spent upwards of $30 billion USD on school building improvements across more than 300 projects in 19 provinces (China Internet Information Center, 2012).

Project Hope run by the China Youth Development Foundation works to improve the infrastructure of the schools in remote areas. This is achieved through reconstructing, building, and renovating current educational facilities (China Youth Development Foundation website, 2019). This initiative is supported through donations and is a partnership between the foundation and government. By developing and improving educational infrastructure, the program aims to increase rural youth education attainment, as well as strengthen the mental and biological health of the students (China Youth Development Foundation website, 2019).

Similarly, the Nathan Yip Foundation runs several school construction projects in China, with the goal of increasing access to education for youth in rural areas. As part of this work, the foundation has built nine schools, serving over 4000 students since its' inception (Nathan Yip Foundation website, 2019). The foundation has also raised money to develop dormitories and cafeterias to ensure that the basic needs of shelter and food are being met during their time at school. When compared to these other programs and initiatives, InterBoxes fits nicely within the framework of developing the educational infrastructure of rural China. By utilizing a socially innovative approach, new buildings and learning resources are being delivered with the goal of strengthening the educational outcomes of left-behind youth.

Though there has been no lack of effort put forth both within the political and philanthropic sectors to improve educational infrastructure, there remains a continuous need for construction and development. These program taken together, along with the case study presented in this paper, suggest creative and collaborative ways for China to continue to increase safety in schools across the country.

6. Methods

In this study, we adopted Yin's (2003) descriptive case study approach which aims to present “a complete description of a phenomenon within its context” (Yin, 2003, p. 5). Information about InterBoxes was gathered from primary and secondary sources. Data collection methods included a total of four in-depth phone interviews with a donor (n = 1), school principal (n = 1), InterBoxes construction vendor (n = 1), founder of InterBoxes (n = 1); a survey of all teachers (n = 8) and students (n = 26); and an archival review of documents pull internet search of traditional news outlets, social media coverage, and other sources including internal documents provided by the InterBoxes management team.

This approach to collecting data from multiple sources, enabled the researchers to document how InterBoxes was established and implemented from different perspectives. Original materials regarding the history, formation, and development of InterBoxes were provided by the founder of the program. In-depth phone interviews were conducted with various stakeholders who shared their own view of the program and how it fills a need in rural China. The Yekeng School principal sent a brief survey to teachers asking how InterBoxes impacts their teaching and student learning. A short survey was also sent to students who were old enough to read and write, regarding their use and perceptions of the InterBoxes library. Examples of the questions include: how often do you visit InterBoxes? What do you usually do at InterBoxes? Due to the relatively small sample size (n = 4), all interview data were transcribed and translated into English; survey data were tallied, analyzed, and discussed collectively by the study team.

7. Business model of InterBoxes

InterBoxes was founded in 2016 by Jiaying Liu during her time as a student at Shenyang Jianzhu University. The innovativeness behind InterBoxes was centered on the idea of using refurbished shipping containers to build school libraries, classrooms, and other educational facilities. Operating under a social enterprise business model the project is divided into two components: an urban and rural arm. In the urban setting, the project proposes that shipping containers will be converted into coffee shops, hotels, bookstores, or office spaces with the goal of generating a financial profit. This income can then be used as revenue supporting the nonprofit arm to build school libraries, classrooms or dormitories in rural areas, thus fulfilling a gap in educational resource provision.

As a startup, the primary goal of InterBoxes is to establish a brand name and reputation as a social solution to deteriorating school conditions in rural China. In theory, once InterBoxes is widely recognized, there will be an increasingly reliable mechanism for attracting investment from companies to support the for-profit commercial applications in the urban areas. It has been emphasized that urban and rural projects would, ideally, be closely connected to share resources across program arms. In this regard, InterBoxes can be understood as a sustainable system and resource that can be used to meet the needs of rural children.

The initial idea for InterBoxes emerged as a response to the poor school building infrastructure and national school merger policy in rural China. As mentioned above, small village schools were merged into the larger town schools in an effort to share better educational resources. Under these conditions, InterBoxes fills a need in service delivery by easily implementing schools in areas where the original facilities have been shut down. Take the InterBoxes library design as an example, it contains bookshelves, moveable tables, chairs, and multimedia facilities. The total area of the unit is 18 square meters, which can comfortably seat 30 students and one teacher. Additionally, all the materials used for the construction of InterBoxes meet the environmental standards in China which include strict emission policies, particularly for composite wood products used in constructing walls and building structures. The building of an InterBoxes is completed at the company factory and then shipped to the selected location with an estimated production period of 7–15 days. During the writing of this case study, InterBoxes had completed four projects, one in Guangdong, Guangxi, Henan, Liaoning, while two more units were under construction in both Henan and Guizhou. All of these unique designs include multi- media libraries.

8. Problem identification: the school setting

This case study of InterBoxes at Yekeng Primary School is located in the rural area of Heyuan City, Guangdong Province. The GDP of Heyuan is one of the lowest in Guangdong Province, which, when compared to the most economically productive city, is about 5% overall (Guangdong Province,Government website, 2018). Moreover, the Yekeng Primary School is situated in a mountainous area where the poverty rate is higher than the province average. The school primarily serves students in the local village or youth from other villages where the closest school is Yekeng Primary. Currently, there are 50 students in grades K-6 but the number of students has declined in recent years. Like most rural areas throughout China, around 80% of the students are considered “left-behind”, meaning at least one of their parents does not regularly live with them. At present there are eight teachers, with more than half having recently joined the school in 2015, indicating the School will remain sustainable in the near future. Regarding funding, the Yekeng Primary School has a stable record of receiving outside financial support in the form of grants. Several foundations and volunteer teams have donated materials including books and school supplies over the past few years. One of the private InterBoxes donors indicated that they have committed school supplies in the past but realized that the improvement of educational infrastructure remains the most important factor is the school is to become sustainable.

9. Implementation

The first step in building an InterBoxes is to make a request through the program website or Wechat public account. Wechat is a popular social media network in China, similar to Facebook. InterBoxes requires that a request be submitted and questions answered on behalf of the school during the application process. Specifically, the applicant must provide information on where the physical space exists to place the Box, determining if the location has a minimum of 50 Mbps internet access, and lastly if there is an individual who will be responsible for daily operations of the new facility. Beyond that, the program requests detailed information about the school, particularly the student body, (e.g., total number of students in each grade, age, gender, ethnicity, proportion of students who are low-income, left-behind children, etc.), as well as teacher and staff data such as age, gender, education background, subject matter taught, and stability of teacher employment. The InterBoxes management team then reviews and identifies a school that appears to be desirable. Desirable schools should share similar educational concepts with the organization and maintain a high level of quality in teaching methods. However, the most important factor in determining a new location, is ensuring the site aligns with the primary financial donor preferences. In this case study, the main donor wanted to support a project in Guangdong Province, thus, Yekeng Primary School was the best fit at that time.

With funding secured and a school site selected, the InterBoxes team then identifies and engages stakeholders including students, parents, teachers, the principal, and government officials, all of whom play important roles on the project. The program team first seeks endorsement from local government officials, which is essential for operation under federal mandates in China. After receiving approval, the team meets with the school principal and teachers to gather their opinions and preferences regarding the project. An example of a discussion prompt may be: “What is the vision of the principal for the future development of the school?” Or: “How does the staff wish to utilize the land within the target area?” The principal will share his/her perspective on where to place the InterBoxes and how to manage its use in the future. Teachers will indicate how to make the project the most beneficial to students, and how it could elevate their teaching strategies. Besides the tangible hardware and facility improvements, principals and teachers often agree that educational resources should be introduced and shared across online networks, which would strengthen the future development of InterBoxes.

Students comprise the majority of the stakeholders, since they access the service most often. To collect their input on the project, members of the InterBoxes staff and the school principal conduct student home visits prior to program implementation. In this case study, InterBoxes team members presented a simulation animation showcasing the structural design to students and collected their suggestions and feedback. Children expressed both ideas and concerns. For instance, some individuals said they were not confident in whether they could successfully use digital devices because they had limited experience with smartphones. To assess this concern, the InterBoxes team members conducted home visits and asked the children to enter and save their parents' phone number into a smartphone. Indeed, it took some children more than five minutes to grapple with this task, with some not being able to complete it successfully. Understanding baseline knowledge and skills of the students regarding information technology was important for the project team as they thought about how to design digital devices that could best match student needs. Moreover, the home visits provided an opportunity for the management team to understand who the children lived with as well as develop a sense of the overall household socioeconomic conditions. When the project team

attempted to engage parents, it was realized that many of the children lived outside of a traditional nuclear family structure and were often in the care of grandparents or a single parent. Lastly, all of the stakeholders who supported the Yekeng Primary School project shared a common concern around safety, regarding student students running up and down the stairs in the library. Acknowledging this concern, the original floor plan was modified and the interior was redesigned, successfully balancing the interests, ideas, and suggestions from key stakeholders.

10. Results

Generally, InterBoxes has become the place to store books which historically have had no central holding location at the school, and as such, the program essentially functions as a library. In the past when books were donated to Yekeng Primary School, the collection was randomly scattered across different classrooms. The principal indicated that the books are now much more centralized and easily accessible, and in turn read more often by students visiting the InterBoxes space.

With respect to InterBoxes use, 27 out of the school's 42 students completed the survey with a response rate of 64%. The non-respondents were likely young students below grade three who were not be able to respond due to their literacy level. In response to the question "How many times do you visit the InterBoxes in a typical week?", about 12% indicated never, one-third visited 1–2 times, 37% visited 3–4 times, and 19% 5 times or more (Fig. 1).

In terms of what students usually did while visiting InterBoxes, around 90% reported reading while the remaining respondents spent their time completing homework. When asked about their favorite area of the facility the answers varied. Table 1 indicates that 22% of the respondents reported they enjoyed spending time on the second floor because it was quiet and had a fresh breeze from a window. Several respondents selected the first floor as their preferred space in the library, noting that it was considerably cooler when compared to the upper level.

Regarding teachers, five of the eight completed the survey. Interestingly, all five teachers stated that InterBoxes functions as a space for students to read and connect to the outside world via technology. Consistent with student responses, teachers indicated InterBoxes provides a comfortable and quiet place for students to read as well as an opportunity to develop a consistent reading habits which are essential for academic success. Additionally, due to having greatly improved internet access, students are now able to participate in massive open online courses as well as other web-based learning resources. As such, the teaching respondents noted that InterBoxes will greatly influence the learning of the Yekeng students by connecting them to broad, far-reaching learning experiences. Several teachers reported that InterBoxes has become a special and unique asset of the school and

Table 1
Favorable places at InterBoxes.

Favorable Places	Number	Percentage
General area on Second floor	7	28.0%
General area on First floor	5	20.0%
Stairway	4	16.0%
Anywhere	3	12.0%
Seating Place	2	8.0%
Close to the fan	1	4.0%
Close to the windows	1	4.0%
No Specific reading areas	2	8.0%
Total	25	100.0%

educational officials from other towns have become interested in the project. Furthering the value of the library, the teachers indicated that they have also used the facility and the newly available resources to improve teaching. For example, one teacher through online research, discovered information that allows them to offer a safety awareness training to students, a course which is highly beneficial for left-behind children.

With respect to future improvement of InterBoxes, the teachers suggested that the functionality could be more diverse. Rather than simply accessing the space to read and use the internet, regular events could be planned during which students and teachers organize book discussions with one another. Such activities would function like book clubs, and give students opportunities to enhance their presentation skills and professional development more generally. Teachers also stated that in the future InterBoxes could offer an "In-Box" network, where users of these spaces could connect with one another, serving as a platform for rural teachers to discuss and share various educational methods.

Overall, the stakeholders interviewed in the study were highly satisfied with the project. In terms of general usage, both the principal and teachers indicated that there are always around ten students who stay in the library after class. Additionally, several students seek extra time to visit, particularly during the ten-minute breaks in-between classes. As such, it is clear that the library is being accessed on a regular basis, providing a new workspace for students and teachers alike. According to the principal, facility improvement is one of the most desirable outcomes of InterBoxes, as reflected by the regular and frequent use of the new library. Because the program is equipped with highspeed Internet access, technology that is new to the school, and the provision of a relaxing place for students to read, the resources of the school have expanded dramatically. Regarding staff, the InterBoxes management team observed that implementation of the project has been heavily dependent on the school principal who tends to be the main, if not sole decision-maker. In an effort to diversify management

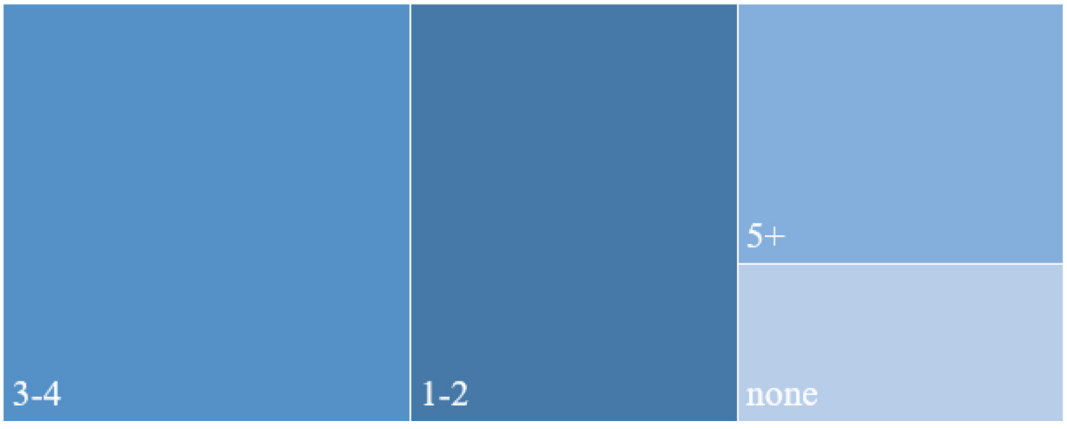

Fig. 1. Number and percentage of InterBoxes use in a typical week(N = 26).

perspectives, the InterBoxes team is planning to work with the school to form a committee with representatives from different stakeholder groups who will oversee the operation and future development of the project.

11. Discussion

As we have demonstrated in this case study, InterBoxes utilizes social innovation to address the problem of the poor-quality school buildings in rural areas throughout China. Our study suggests that the innovativeness of InterBoxes is realized in the following areas: affordable, ease of construction, infrastructure improvement, mobility, and education quality.

First, InterBoxes is an affordable building option because the overall materials and labor costs are relatively low. As discussed earlier, the number of schools in rural China has been dramatically reduced. Thus, there is little incentive for public officials to invest in the construction of new buildings, with many old structures sitting vacant. This is especially true in poor areas with limited resources, locations where schools could be closed and merged at any time. Despite this uncertainty, China has a nine-year free and mandatory education policy which dictates that districts must find ways to provide a decent school environment for children to learn, a policy somewhat at odds with the school merger movement. InterBoxes provides an innovative solution to the need for low-cost educational infrastructure. Depending on the project type, the total operating costs including the cargo containers, design, furniture, equipment, delivery and installation are estimated at 100,000RMB (approximately US $13,000). Construction costs for a compatible physical building with similar size would be considerably higher. In addition to being less costly, InterBoxes can be fully constructed and customized in a short amount of time, particularly when compare to the building process of schools using brick and mortar. Moreover, traditional buildings are highly regulated by licensing and land use requirements, regulations which impede the speed of development.

InterBoxes also provides a modern solution to improving poor rural building infrastructure. Existing research indicates that school environment is a major contributing factor for effective teaching and learning. For example, it has long been recognized that there is a modest but positive relationship between building condition and student performance (Gunter & Shao, 2016). Due to deterioration and lack of proper maintenance, many rural school buildings are considered unsafe by today's increasingly strict standards. In addition to structural problems, age-old buildings suffer from water leakage, poor lighting, ventilation issues, weatherization, and lead-poisoned paint. Students in these facilities, many of whom typically spend six to eight hours a day at school are at risk of being exposed to these hazardous environments. Thus, the interaction of person-in-environment will not only impact children's attention levels while learning, but will also be harmful to their physical health. Additionally, from an aesthetic perspective, both the outside and inside of the Yekeng school library project were thoughtfully and professionally designed, utilizing the latest architectural concepts. As a result, students and teachers alike found the InterBoxes library an attractive and comfortable environment in which to learn and study, feelings that were reflected in the survey responses.

Another key feature that cannot be matched by traditional building methods lies in the fact that InterBoxes is mobile, meaning it can be removed from the current site and transported to another location if necessary. As discussed earlier, this is especially important in rural China because schools are consistently at risk of closure as policies move towards merging schools and resources. Under these circumstances the physical structures of existing school buildings are left to be abandoned, thus wasting construction resources. Thus, the mobility of InterBoxes provides unmatched flexibility for public officials to make decisions in response to the rapidly changing demographic structure in China, urban and rural areas alike. Additionally, InterBoxes could also be a viable solution to ease the shortage of space such as classrooms and other facilities in areas facing a rapid influx of school-age children in a timely fashion.

By design, InterBoxes is an environmentally-friendly and sustainable structure which utilizes solar power and natural resource conservation ideas. Furniture and equipment are primarily constructed using renewable materials that meet green building standards, successfully reducing negative impacts on the environment. Though the concepts of energy-efficiency and sustainability have been widely publicized, school facilities are seldom constructed within this framework, especially in rural China. InterBoxes, therefore, does not only function as a school facility but also serves as a model example for environmentally friendly education.

Though InterBoxes can be used in many different forms, our case study features a library at Yekeng Primary School completed with a high-speed internet connection, something that few rural primary schools are able to access. Despite the increasing popularity of the internet, a digital divide remains, presenting a major problem in China, especially in rural areas where the infrastructure for technology is limit and subscriptions to internet services are not affordable for most families (Yang et al., 2013). The 2018 Statistical Report on Internet Development in China found that only 36.5% of rural areas in China have internet coverage, compared to 72.7% of their urban counterparts. Nationally, 62% of non-netizens reside in rural areas (China Internet Network Information Center website, 2018). As a result, children growing up in rural China lack the opportunity to access important technology and are at risk of being left even further behind in today's new information age (Minges, Kimura, Beschorner, Davies, & Zhang, 2014). Utilizing both a physical and virtual library via books and high-speed internet, InterBoxes presents as an innovative solution to inequitable information access, successfully opening a window to the outside world for Yekeng Primary School students. Outside of the typical classroom setting, the library is perhaps one of the most important places to facilitate learning in schools. In addition to having access to books, students can study, read, and interact with one another, generating a hub of both social and academic resources that go beyond the school boundary. The InterBoxes library makes electronic classroom learning and the use of modern information and communication technologies possible.

The responses from both students and teachers in our case study also highlight the value of the internet as it relates to diversifying educational opportunities. Through utilizing online classrooms, and connecting with learners outside of rural China, students develop an increasing awareness of the world around them. Additionally, teachers are now able to access web resources, which in turn will allow them to continue to grow professionally and integrate new methods into their current lecturing practices. In this way, InterBoxes aims to strengthen education in rural China not simply through physical infrastructure improvement, but also through building the online connectedness of the school, staff, and students. Looking to the future, as more InterBoxes are built, the quality of education in rural areas of China will continue to improve, developing the future opportunities of left-behind children.

Additionally, InterBoxes has been used as a tool to build social capital within the school community. For example, InterBoxes manages a Discussion Group on Wechat where members can share their experiences of using InterBoxes. This has created an online community in which people learn from one another, exchanging information and ideas that could benefit principals, teachers, and the school as a whole. Responses to the teacher surveys in this case study highlight the potential value InterBoxes offers in terms of developing social capital and building professional networks. In an effort to scale the program, InterBoxes is currently raising funds to run a contest focused on highlighting an exemplary application of the program model, featuring best practice examples and making successful stories known to the larger general public.

12. Study limitations

This study presented a novel approach to filling educational needs in rural China. However, it is not without limitations. Although our findings suggest the implementation of InterBoxes in Yekeng Primary School appears to enjoy early success, it is too early to generalize to other InterBoxes sites as well as similar initiatives. In addition, as a cross-sectional study, the long-term effect and impact of InterBoxes on student learning remains unknown. For future research, it will be necessary to conduct a comprehensive, longitudinal, multi-site, cross-case evaluation of the project.

13. Scaling the business model

Our case study of the Yekeng Primary School library indicates that there is great potential for InterBoxes to positively impact the improvement of school facilities and education opportunities for children in rural China. The library and associated resources are utilized regularly, and the program offers tremendous opportunities to connect to global learning networks. However, as is expected with new program implementation, there are some challenges that should be discussed. Our findings reveal that a long-term strategic development plan for InterBoxes could be developed more fully. Since its inception, InterBoxes has been primarily operated as a donor-driven, privately funded philanthropic project, rather than a self-supported, social enterprise model as was originally intended. As such, the management team will be unable to commit to building any additional units until sufficient funds are secured on a case-by-case basis. Fund-raising is not only time consuming but also presents some doubt regarding whether the budget will be large enough to support program expansion. Facing uncertain funding, sustainability is a concern that could in time, limit the prospect of future growth. Additionally, it is clear from our case study, that the InterBoxes library was viewed as a positive new asset to the Yekeng School. This finding supports the goal of program sustainability, primarily that usage of the facilities will continue and increase over time. However, it will be important for the InterBoxes business development team to integrate feedback from current users as they develop plans for future modifications and construction. For example, creating an InterBoxes social media group would prove useful in strengthening ties between teachers, students, and management teams more generally. This in turn, could help new programs orient to the opportunities offered through the program more expediently. Of course, as with any model scaling, to be successful, it is advisable for InterBoxes to consider broadening its application and services offered, building additional units in other areas as well as diversifying funding mechanisms.

14. Alternative box programs

InterBoxes is not alone in utilizing cargo containers as an approach to infrastructure development. Across the globe there are socially innovative programs that are using this cost-effective and environmentally friendly approach to fill unmet needs in social welfare and educational systems. For example, *Compassion for Migrant Children* founded in 2006 is located in the suburbs of Beijing and uses shipping containers to build community centers and schools for the growing migrant population. The program focuses on providing educational opportunities for migrant youth, who through Hukou, are not allowed to attend local school and are not able to afford the steep price of private school enrollment (Dempster, 2011).

Signal Shala located in Mumbai, is a program committed to increasing access to education for low-income urban youth. Founded in 2016, *Signal Shala* used a discarded shipping container to build a school in one of the city's most impoverished, resource deprived neighborhoods. The goal of the program is to provide access to education to homeless youth. In addition to reducing barriers to education, the program aims to strengthen social and cognitive skills through social participation and engagement (Signal Shala website, 2019). Currently 30 youth attend *Signal Shala*, with the school reporting a completion rate of 99% for the most recent academic year.

Education is not the only social need that shipping container programs have been developed to address. Targeting homelessness, *Help Bristol's Homeless* is a social enterprise located in Great Britain. This program uses recycled shipping containers to build temporary housing for Bristol's homeless adult population. Established in 2017, *Help Bristol's Homeless* embraces a housing first approach to mediate the challenges of housing insecurity. In addition, the program connects clients to other support services, necessary for leading a stable and healthy life (Help Bristol's Homeless website, 2019).

Perhaps the oldest and most diverse program, *Breadline Africa* uses shipping containers as a low-cost building material across a variety of sites dedicated to strengthening communities through infrastructure development. Founded in 1993, *Breadline Africa* engages projects committed to supporting early childhood literacy and development. In doing so the program has installed over 450 libraries, education centers, medical offices, and therapy spaces, in resource deprived, rural South African communities (Breadline Africa website, 2019). As presented in the 2017 annual report, rather than developing a for-profit arm, the program budget is comprised of donations, investment income, and federal dollars.

Given the breadth and success of other creative shipping container programs, there exists an opportunity to develop a global network within the social innovation sector. Such a collaboration would allow for an international exchange of ideas and knowledge between a diverse array of practitioners. We suggest that InterBoxes should consider this when working to scale the current business model. Because the for-profit arm of the organization has yet to be fully launched, learning about alternative avenues of funding would be beneficial when working to form a sustainable model of service delivery. Developing a global network would also allow for the formation of evidence-based best practices, which would serve as guidelines for others interested in launching a similar program.

15. Conclusion

In closing, social innovation is an approach to solving complex social issues through creative, effective, collaborative, and novel methods. Often these practices are newly emerging, yet to be evaluated, and highly responsive to the unique needs of the surrounding environment. As presented throughout this paper, China is particularly well suited to support the growth of socially innovative practices as the country moves increasingly into an open market economy and begins to deconstruct historically restrictive policies. In response to a growing need for service provision, social innovation will remain a popular option when considering the formulation of new business models. Startup organizations and social enterprises such as InterBoxes present sustainable, low-cost opportunities for working towards the overarching goal of ameliorating an array of social issues, including early childhood education, elder care, environmental pollution, homelessness, and mental health disparities. As described by the teachers, students, and staff associated with our case study, InterBoxes offers an exciting opportunity for those living in rural China access to high quality education and resources to build creative and modern educational methods.

Looking to the future, developing an international network of programs that utilize recycled cargo shipping containers could lead to the development of globally recognized best practices, and would furthermore offer an opportunity to scale-up the current work of the InterBoxes program by integrating an increasingly diverse approach to funding acquisition. Until then, InterBoxes will continue to work to strengthen the infrastructure and educational resource availability to children in rural China using a socially innovative social enterprise

business model.

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Statement on conflict of interest

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